

# PLANETARY HABITABILITY IN BINARY SYSTEMS

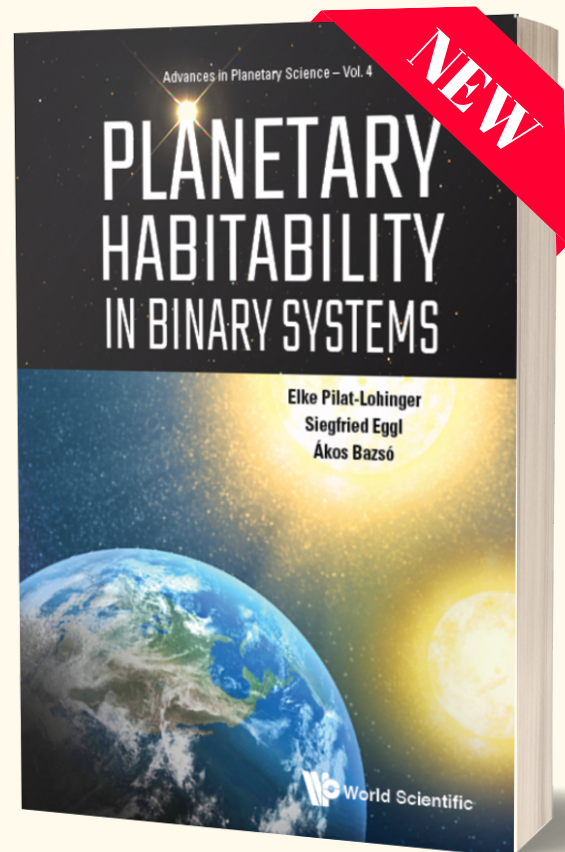
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Astrophysical research has led to the detection of thousands of planets outside the Solar System. About one-tenth of the extrasolar planets discovered so far reside in binary- or multi-stellar systems, and some of the closest known rocky exoplanets populate these multiple-star systems. While such environments seem good places to look for a second Earth, can Earth-like planets with two or more suns be habitable? And do solar system-like configurations have to be detected to find a habitable exo-Earth?

This book addresses these questions. Starting with a brief overview of the various types of double star-planet configurations that have been observed so far, the book discusses the intriguing variety of planetary motion in such environments, taking into account the stellar type, evolution, and activity, and elaborates on how the presence of an additional stellar companion affects planet formation, system architectures and the habitability of planets in binary star systems. New methodologies developed in this area of research are explained and demonstrated for systems such as Alpha-Centauri, HD41004, Kepler-35, and many others. This monograph provides a grand entry to the exciting results that we expect from new missions like TESS, CHEOPS and PLATO.

**Contents:** Binary Stars; Orbital Motion in Binary Star Systems; Perturbations in Multi-Planet Binary Star Systems; Terrestrial Planet Formation in Binary Stars; Implications of Stellar Binarity; Habitable Zones in Binary Star Systems; Habitability of Known Planets in Binary Star Systems;

**Readership:** Graduate students, researchers, and scientists specialising in planetary science and space research.

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## About the Authors



**Elke Pilat-Lohinger** is currently project leader, researcher and lecturer at the University of Vienna, Austria where she received her PhD in 1994. After graduation she moved to France for a postdoctoral fellowship (FWF Erwin Schrödinger grant) at the Observatory of Nice in 1996 and 1999. Dr Pilat-Lohinger has worked at the University of Vienna since 2000, with the financial support of the Austrian Science Fund (FWF). With the honourable Hertha- Firnberg-Grant, she started working on the stability of extra-solar planetary systems, followed by a series of FWF projects covering the following topics: extra- solar planetary research, astrobiology, dynamical astronomy, and solar system dynamics



After completing his PhD thesis on the subject of the habitability of terrestrial planets in binary star systems at the Institute for Astrophysics of the University of Vienna, Austria, **Siegfried Eggl** moved to Paris, France, in 2013. There, he worked as a post-doctoral research associate at the Institut de Mécanique Céleste et de Calcul des Ephémérides (IMCCE) in planetary defense. In 2016, Dr Eggl accepted a research appointment at the NASA Jet Propulsion Laboratory, California Institute of Technology in Pasadena, California, USA, where he is working to date.



**Ákos Bazsó** graduated with a PhD in 2015, from the University of Vienna, Austria. Since then, he's worked there as a Post-Doc researcher, specialising on extending the concept of habitability to binary star systems. His main fields of research are the dynamics of planets and minor bodies in the solar system, as well as dynamics and resonances in extra-solar planetary systems, including binary and multiple star systems.

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